

## HEALTHY SOILS: Information about testing your yard or garden

*The Oregon Health Authority (OHA) has received many questions from private citizens, daycares, schools, and neighborhood gardeners about soil testing on private properties located one half mile away from artisan glass factories in southeast and North Portland. This factsheet provides answers to common questions. Additional resources are available at [www.healthoregon.org/metalsemissions](http://www.healthoregon.org/metalsemissions).*

### Considerations prior to testing

In all urban areas, it is important to consider past and present uses of, and around, your yard and garden site. If you have concerns based on known or potential contamination, testing your soil is the only way to know what is in your soil. Whether you test your soil or not, we recommend that all urban gardeners adopt best practices for safe urban gardening referenced in the OHA Healthy Gardening fact sheet, and [website](#).

Before you make a decision about testing, consider how likely it is for you or others to come into contact with the soil. Is your yard covered by a lawn, mulch, rock, or other materials that do not allow bare soil to be exposed? When bare ground is covered it's harder for people to come into contact with the soil. A person must come into contact with, or be exposed to, a high enough level of contamination in soil for it to cause harm to their health. In most cases, to be exposed to contaminants in soil, a person must swallow the contaminated soil. This is of most concern for young children who play on the ground, in dirt, and frequently put their hands in their mouths. Children, and adults, should wash their hands before eating and after playing outdoors.

*The only way to know what is in your soil is to test for the contaminants of concern.*

There are [laboratories serving Oregon](#) that will test soil for heavy metals. Most laboratories provide instructions for how to collect, store, and deliver soil samples for accurate testing. Review the resources provided under "How to test your soil" on the OHA Healthy Gardening [website](#) before you sample soil in your yard or garden and have it tested.

### Getting started – creating a sampling plan

Creating a sampling plan will assist you with collecting samples that are meaningful and address your sampling goals. Consider the following in your plans for sampling:

#### 1- Soil depth

If your goal is to understand the risks from soil in your yard, you will most likely want to collect soil samples less than six inches below the surface. This is because digging deeper than six inches is not a common activity for people in yards. If you are wanting to

understand risks in an area of your yard or garden where digging at depths below six inches is a common activity, then your soil samples will need to be collected at a deeper level.

2- *Past and current use*

Information about past uses, current uses and your knowledge of your property should inform what to test for. Do you live in an area that was at one time agricultural, an orchard, next to a gas station, dry cleaner, atop a former landfill, or nearby a traffic corridor? The type of use will help determine the types of contaminants commonly associated with the uses.

3- *Consider how certain parts of your yard are different*

It may be informative to keep samples from specific areas of your yard separate from one another. For example, if you sample close to the exterior walls of a home or building built before 1980 there is a higher likelihood that your samples will test higher for lead, due to lead paint chips that remain in the soil. You may have an area of your yard where children play, and dig in the soil. Part of your yard may include an in ground or raised bed garden, another area of your yard may be covered with sod. By keeping soil samples separate you will be able to identify where contamination is higher. This will inform your efforts to lower contamination levels and potential risks.

Some substances that can be contaminants also occur naturally in soils, for example metals. Lead is a metal that is found naturally in soil, and prior to the 1980s it was used in leaded gas and lead paint. A metals test is common for urban soils. It's also important to test for indicators of soil health such as nutrient and pH levels. This is because research has found that healthier soil lowers risks of contaminants moving through the food chain and harming people.

## Interpreting yard or garden soil test results

The process of interpreting yard or garden soil test results involves comparing the number that you get back for each contaminant that you tested for against screening levels. It's important to know that currently there are no federal or state agency standards for soil screening levels specifically for gardens. We recommend comparing against three screening levels, in the following order.

- 1- The *first screening* is the Department of Environmental Quality (DEQ) estimate of the background levels for metals. Find the background levels for metals the geographic area where you live (for example, the Portland Basin). The DEQ [fact sheet](#) provides the values for background levels of metals for the different regions, and explains how background numbers were determined. Comparing your soil sample results to background levels lets you know if your results are higher than what is expected for your region.
- 2- The *second type of screening* is DEQ's Residential Screening Level. DEQ's Residential Screening Levels are Risk Based Concentrations ("RBCs"). They establish soil cleanup levels based on proposed reuse for contaminated sites. Residential reuse requires the most stringent cleanup level as it assumes children and families will live on the property. The Residential Screening Level is used for residential (yard) soil.

Note: There are no federal or state agency standards for soil screening levels for gardens. Urban agriculture doesn't fit into the current categories of regulated/zoned land use. We recognize that gardening creates different exposure pathways – people are in closer contact with the soil than for any other category, for different time periods. The overall time and proximity to soil and potential contaminants make gardening different from residential or commercial use. Most states use Residential Screening Levels as their guide, and it captures some of the exposures from gardening.

- 3- The third type of screening level is developed by the federal Agency for Toxic Substances and Disease Registry (ATSDR), which is a part of the Centers for Disease Control and Prevention (CDC). These public health screening levels are called Environmental Media Evaluation Guides (EMEGs) and Reference Dose Media Evaluation Guides (RMEGs). Public health screening levels are calculated in a way that is very similar to DEQ's Residential Screening Levels as described on ATSDR's website (section 3 of [Appendix F](#) of ATSDR's Public Health Assessment Guidance Manual). ATSDR's screening levels are different from EPA and DEQs screening levels because they are not calculated for purposes of establishing levels for cleaning up soil contamination; rather they are calculated to assess human health risks.

The table below illustrates how you can compare your individual results against screening levels. In this table, the background levels for metals are for the "Portland Basin". If you do not live in the Portland Basin you will need to update the numbers with those from your region. Background levels for each region are found [here](#).

**Table Screening level comparisons**

<b>Metal</b>	<b>DEQ Background<sup>1</sup></b>	<b>Residential <sup>2</sup></b>	<b>ATSDR Values <sup>3</sup></b>
Aluminum	52,300 <sup>b</sup>	77,000 <sup>a</sup>	50,000
Arsenic	8.8	0.43	15
Cadmium	0.63	78	5
Total Chromium <sup>e</sup>	76	120,000	75,000
Chromium(VI)	NA	0.3	45
Cobalt	33 <sup>c</sup>	23 <sup>a</sup>	500
Iron	36,100 <sup>b</sup>	55,000 <sup>a</sup>	NA
Lead	79	400	NA
Manganese	1,800	1,800	2,500
Mercury	0.23	23	15
Nickel	47	1,500	1,000
Selenium	0.71	390 <sup>a</sup>	250
Uranium	3 <sup>d</sup>	230 <sup>a</sup>	150

1- Source DEQ background metals fact sheet,

<http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf>

2 - Residential Values are DEQ soil screening values, where available, or EPA regional screening values (RSLs) When no DEQ residential value is published.

3 - Agency for Toxic Substances and Disease Registry (ATSDR) Screening Values. ATSDR values are environmental media evaluation guides (EMEGs), or reference dose media evaluation guides (RMEGs).

a - Residential values for these metals are the US EPA Regional Screening Values (RSLs) for residential use.

b - Background values shown are from Washington Department of Ecology Pub. No. 94-115

c - No background estimate for cobalt has been published by DEQ. Value shown is average of Willamette Valley soil from DEQ database.

d- Background estimate from Toxicological Profile for Uranium, US ATSDR, February 2013.

e- Background value is based on total chromium. Screening Values are based on trivalent chromium.

NA - Not Available - No estimate of background soil concentration or screening values are available for these metals and agencies.

## **Additional resources for interpreting contaminant levels in yard or garden soil test results**

Understanding Your Test Results: Metals in Garden Soils and Vegetables – New York State Department of Health and Cornell University

<http://cwmi.css.cornell.edu/UnderstandingTestResultsMetalsSoilsVeg.pdf>

Healthy Soils, Healthy Communities – Metals in Urban Garden Soils – New York State Department of Health and Cornell University

[http://cwmi.css.cornell.edu/Metals\\_Urban\\_Garden\\_Soils.pdf](http://cwmi.css.cornell.edu/Metals_Urban_Garden_Soils.pdf)

Oregon Health Authority, Public Health Division, Environmental Health Assessment Program

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